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Attention-Deficit/ Hyperactivity Disorder and Correctional Health Care

Robert F. Eme, PhD, ABPP

Two thirds of all felons released from state prisons are rearrested within 3 years. This appalling recidivism rate explains the intense and growing interest on the topic of desistance from crime. Yet, inexplicably, one of the major factors affecting desistance from crime and the recidivism rate has received scant attention. That factor is attention-deficit/hyperactivity disorder (ADHD). This article establishes the widespread prevalence of ADHD in the prison system and the critical importance of identifying and treating ADHD as an essential component for any best practice models for preventing crime and reducing recidivism. It also examines the major mechanisms whereby ADHD increases the risk for crime and recidivism.

Keywords: ADHD; correctional health care; prisoners; recidivism

Picture a toy top spinning on a table. When it spins at top speed, it operates efficiently and in balance. As the top slows, it shifts slightly from its perfect balance and begins to wobble. As it slows further, the wobble becomes more pronounced. The toy begins a random dance around the tabletop. Finally, it races out of control, lurching wildly until it careens off the table or falls over.

Many people are born with brains that operate like balanced, high-speed spinning tops. Others go through life with brains that resemble the slowing top, sending them in random, destructive directions. We know some of them by labels such as "defendant," "probationer," "parolee," or "inmate"—people who end up in the criminal justice system with a highly treatable but often overlooked disorder: attention-deficit/hyperactivity disorder (ADHD).[1] In fact, at least 25% of inmates have ADHD. The evidence for this critical fact will be presented in the following section.

This means that, at a minimum, one out of every four persons accused of a crime and appearing before corrections professionals has ADHD. These professionals include judges, prosecutors, defense attorneys, jail staff, and parole board members, plus probation, corrections, law enforcement, and parole officers. Yet, inexplicably, despite the fact that a solid knowledge of ADHD is an essential component for improving the quality of health care

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From the American School of Professional Psychology, Argosy University, Schaumburg, Illinois.

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Address correspondence to: Robert F. Eme, PhD, ABPP American School of Professional Psychology, Argosy University, Schaumburg Campus, 999 Plaza Drive, Suite 111, Schaumburg, IL 60173; e-mail: reme@argosy.edu.

in corrections, it appears that this disorder has received scant, if any, attention. The failure to identify and properly treat this serious disorder doubtlessly contributes to recidivism.

Two thirds of all felons released from state prisons are rearrested within 3 years (R. Doyle, 2003). This appalling recidivism rate has generated an intense and growing interest on the topic of desistance from crime (Kazemian & Farrington, 2007). However, explicit reference to the relevance of ADHD for understanding and reducing recidivism is lacking in all of the following: (a) the best practice models proposed at the Mental Health in Corrections Consortium (2006, 2007) conferences, (b) the February 2007 issue of the *Journal of Contemporary Criminal Justice*, which was devoted to the topic of desistance from crime, and (c) the best practice model proposed for a national strategy for early prevention of delinquency (Welsh & Farrington, 2007). Finally, a search of article titles in all of the issues through July 2007 of the *Journal of Correctional Health Care* did not find a single study that mentioned the term ADHD.

The purpose of this article is to provide a succinct review of literature to inform correctional health professionals of the vital importance of identifying and treating ADHD as an essential component for any best practices model for improving the quality of mental health care. It will explain the current conceptualization of ADHD and the major mechanisms whereby ADHD increases the risk for criminality and recidivism. For the purposes of this review, ADHD will refer to what the Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev. [DSM-IV-TR]; American Psychiatric Association, 2000) designates as the combined type.

ADHD

There is a robust international consensus that ADHD is a real developmental disorder characterized by symptoms of inattention, impulsivity, and hyperactivity (Barkley, 2002, 2006d; A. Doyle, 2006; Nigg, 2006). It is the most commonly diagnosed behavioral condition in youth, affecting approximately 7% in the United States (Nigg, 2006), with males outnumbering females by ratios of 6:1 in clinic-referred samples and 3:1 in non-clinic-referred samples (Barkley, 2006d). These prevalence rates are the same in Europe and hence add to the international consensus in refuting the contention that ADHD is either a culturally based construct peculiar to the United States or a bogus disorder confected by an avaricious medical profession (Moffitt & Melchior, 2007; Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). Approximately 80% of children diagnosed with ADHD continue to display their symptoms to a significant degree into adolescence and young adulthood (Barkley, 2006a), resulting in an adult prevalence rate of approximately 4% (Kessler et al., 2006). Note that this prevalence rate is undoubtedly an underestimate because of the inadequacy of using the same criteria that are used in childhood to diagnose ADHD in adolescents and adults (Barkley, 2006c; Barkley & Murphy, 2006; Kessler et al., 2006).

It is critically important to understand that ADHD is not simply a disorder confined to childhood but rather is a chronic disorder that severely impairs learning and behavioral control and hence can profoundly compromise functioning in multiple areas throughout the life span (Barkley, 2006a, 2006d; Biederman & Farone, 2005; T. Brown, 2005, 2006; Nigg, 2006). It is perhaps a lack of understanding of this fact that explains the pervasive neglect of the role of ADHD in criminality and recidivism (Hurley & Eme, 2008). The reason why ADHD can have such a profoundly, chronically adverse impact on life functioning in virtually every domain (e.g., education, occupation, family relationships, driving, etc.; Chamberlain, Robbins, & Sabakian, 2007) is that the cardinal symptoms of inattention, impulsivity, and hyperactivity are indicative of serious impairments in the brain's control and management systems, referred to as executive functioning (EF) systems (Barkley, 2006c; Biederman & Farone, 2005; T. Brown, 2005, 2006; Nigg, 2006). Hence, an adequate understanding of ADHD requires an adequate understanding of what is meant by EF.

Prevalence in the Criminal Justice System

In one respect, this section is the most important of the article because it will establish that the prevalence of ADHD in the criminal justice system is of sufficient magnitude to warrant attention. Detailed evidence will demonstrate that the prevalence rate for male and female adolescents and adults in the correctional system is at least 25% and probably higher. A prevalence rate this high must be taken into account by those working in the criminal justice system if they want to follow a best practices model.

Juvenile Criminal Justice System

Determination of ADHD prevalence in the juvenile criminal justice system is based on three different methods of diagnosis. In making a diagnosis, the most important component of an evaluation of a juvenile suspected of having ADHD is the gathering of information from multiple sources (juvenile, parent, and teacher; Barkley & Edwards, 2006; Pelham, Fabiano, & Massetti, 2005). The least satisfactory method is one based exclusively on an interview with the juvenile because of juveniles' tendencies to underreport ADHD symptoms (Barkley & Edwards, 2006).

The first method for estimating prevalence in which information is gathered from multiple sources using structured interviews and well-standardized rating scales is the most valid (Pelham et al., 2005). Numerous studies using these procedures have yielded mountainous evidence that the combined type of ADHD is an exceedingly common comorbid condition of conduct disorder (CD). This means that if a person has CD, typically between 20% and 50% of juveniles of both sexes, and in some studies an astounding 100%, will also have ADHD (Barkley, 2006c; Klein et al., 1997; Lahey, Loeber, Burke, & Applegate, 2005; Lynam, 1996; Waschbusch, 2002). In the broad spectrum of conduct problems, CD captures the violent, overtly destructive dimension (McMahon & Frick, 2005) that is codified in the DSM. CD refers to the more severe antisocial and aggressive behaviors that result in serious violations of others' rights (McMahon & Frick, 2005) and its very nature involves aggressive, violent, confrontational behavior (Hartung & Widiger, 1998), which is the best predictor of criminality (Huesmann, Eron, & Dubow, 2002). Juveniles who are comorbid for CD and ADHD display a more pernicious form of antisocial behavior than those with a single disorder in terms of a greater range, severity, and persistence of antisocial activity and greater academic impairment (Barkley, 2006b; Hinshaw & Lee, 2003; Pliszka, 2006). This strikingly high comorbidity of ADHD with CD is probably the most accurate estimate of the prevalence of ADHD among juveniles in the criminal justice system because most juveniles are incarcerated because of serious antisocial behavior and hence most would warrant a diagnosis of CD.

The second method involves accepting prior diagnoses of ADHD of incarcerated youth. Prior educational data based on individualized education programs (IEP) indicate that 28% of those with IEPs have an ADHD diagnosis (Tudisco, 2006). Note that this is a minimal prevalence estimate because it does not include those juveniles who have a prior diagnosis of ADHD that is not included in the IEP or who are undiagnosed (Tudisco, 2006).

The third method involves using a variety of self-report methods, which, as previously noted, tend to underreport various ADHD behavior and symptoms. Vermeiren (2003) reviewed several studies of incarcerated adolescents and reported prevalence rates ranging from 20% to 72%. In a very well-designed study, Templin, Abram, McClelland, Dulcan, & Mericle (2002) used a structured interview to assess a randomly selected sample of incarcerated youth and reported prevalence rates of 17% in males and 21% in females aged 10 to 18.

In summary, although prevalence estimates can vary widely from 17% to almost 100% because of methodological differences in the studies, such as criteria used for diagnosing ADHD (Farone, Sergeant, Gillberg, & Biederman, 2003; Polanczyk et al., 2007) and the settings in which individuals were recruited (Rosler et al., 2004), the aggregate evidence unequivocally yields a conservative estimate of at least 25%, with the true prevalence probably being higher.

Adult Criminal Justice System

The data from adult corrections yield a similar ADHD prevalence of 25% even though the data base is much smaller. In his authoritative review of the literature, Barkley (2006c) reported that he could only find one published study in the United States. The study (Eyestone & Howell, 1994) involved a random sample of 102 inmates in the Utah State Prison who were evaluated for ADHD using self-report for ADHD symptoms. This study found a prevalence rate of 26% and cited an unpublished master's thesis that found a similar prevalence rate for adult ADHD in a prison population. Again, as previously noted, these rates underestimate the true prevalence rate to an unknown extent because they rely on criteria that are more characteristic of childhood rather than adult ADHD and rely exclusively on self-report. Accurate diagnosis of ADHD in adults (as well as children) requires the report of significant others such as spouses (Barkley, Murphy, & Fischer, 2008), which prison studies lack.

It is interesting to note that European prevalence rates of ADHD for those in prison tend to be higher than in the United States, with a very well-designed study reporting a 45% prevalence among young adult males in Germany (Rosler et al., 2004). This study also reviewed a number of other European studies of prisoners in which rates ranged from 51% (Finland) to 15% (Sweden). These rates, as with the previously cited worldwide general population prevalence rates for ADHD, further support the accuracy of the conservative 25% estimate by indicating that this finding is not simply a peculiar American phenomenon.

Additional evidence for the 25% prevalence rate comes from the three studies of clinically referred male children with ADHD who were followed up into adulthood (Barkley et al., 2008; Mannuzza, Klein, Konig, & Giampino, 1989; Satterfield et al., 2007). The Satterfield et al. (2007) study findings, which are similar to those of the other two studies, give the best estimate of this risk because this study has the longest follow-up. The study examined the official arrest history of 179 clinically referred white boys (aged 6 to 12) with ADHD and 75 community-control white boys from adulthood to midlife (18 to 38 years). After eliminating differences in socioeconomic status and intelligence quotient as possible explanations, the study found that the conviction and incarceration rates were 28% ADHD versus 6% control for conviction, and 25% ADHD versus 6% control for incarceration.

Finally, it should be noted that even though most of the research failed to study females, when they were studied, prevalence rates equaled or exceeded that of males (Templin et al., 2002; Waschbusch, 2002). This is not an unexpected finding because female offenders generally demonstrate higher rates of mental health problems than males (Cauffman, Lexcen, Goldweber, Shulman, & Grisso, 2007). This finding has been termed the "gender paradox" in that, although females are typically less likely to have any kind of mental disorder, when they do develop a disorder they tend to be more disturbed than males. The reasons for this are examined in Eme (1992) and Cauffman et al. (2007).

In summary, it can be taken as a certainty that the prevalence rate of ADHD among adults in the correctional system is at least 25% and probably higher. A prevalence rate of this magnitude must be addressed by the system.

Executive Functions

Although there is no universally accepted definition of EF, the most prominent researchers agree that EF refers to brain circuits that help control, prioritize, and integrate an individual's thoughts, emotions, and behaviors (Barkley, 2006c; Biederman, 2006a, 2006b; Biederman & Farone, 2005; T. Brown, 2005; Halperin & Schultz, 2006; Krain & Castellanos, 2006; Nigg, 2006; Seidman et al., 2006). An apt analogy for an EF is that of the conductor of an orchestra (T. Brown, 2005, 2006). Think of the conductor as the brain's executive who controls, regulates, and guides the musicians in much the same way the brain's EF controls, regulates, and guides an individual's thoughts, emotions, and behaviors. If the conductor does a good job, the music is glorious; if not, even if the musicians are the best in the world, the music will be a disaster in much the same way as an individual with ADHD, even if superbly gifted, can lead a disastrous life. There is an abundance of evidence that deficits in EF are caused by genetic and neurological factors (e.g., brain injury, low birth weight, and prenatal exposure to maternal smoking), which result in impairments in frontal-striatal-cerebellar brain circuits and therefore deficits in the executive functions that these circuits subserve (Biederman, 2006a, 2006b; Biederman & Farone, 2005; Halperin & Schultz, 2006; Krain & Castellanos, 2006; Neuman et al., 2007; Nigg, 2006; Seidman et al., 2006; Valera, Farone, Murray, & Seidman, 2007).

As with the definition of EF, there is no universally accepted model of what the different EFs are (Barkley, 2006c; Biederman, 2006a, 2006b; Biederman & Farone, 2005; T. Brown, 2005; Halperin & Schultz, 2006; Krain & Castellanos, 2006; Nigg, 2006; Seidman et al., 2006). Explanations of ADHD have traditionally been based on causal models in which a single, common core EF dysfunction is theorized to explain all the deficits and symptoms of ADHD (A. Doyle, 2006; Sonuga-Barke, 2005). However, recent developments in the understanding of the neuropsychological heterogeneity in ADHD have led to a paradigm shift toward models that understand ADHD as an umbrella construct. This understanding means that ADHD refers to a disorder characterized by a number of different neuropsychological deficits, mediated by different neurological brain circuits, resulting in different manifestations of ADHD, and therefore necessitating different treatment approaches (Biederman & Farone, 2005; Castellanos, Sonuga-Barke, Milham, & Tannock, 2006; A. Doyle, 2006; Nigg, 2006). T. Brown's model (2005, 2006) that proposes deficits in six different EF functions has substantial scientific support in that they can be linked to various brain circuits (Castellanos et al., 2006; Nigg, 2006; Posner & Rothbart, 2007; Seidman et al., 2006). Hence, the model provides a useful and scientifically sound way for understanding how the impaired EF in ADHD markedly increases the risk for criminal offending and recidivism.

Brown Model of EF Deficits

The Brown model (2005, 2006) posits six EF functions, which will be briefly described along with a case history vignette that illustrates how the particular EF deficit can impair life functioning.

Action: Controlling or Inhibiting Behavior

This is the most commonly agreed on impaired EF function (e.g., Barkley, 2006c; T. Brown, 2005; Castellanos et al., 2006; Nigg, 2006) and perhaps the one whose impairment is most relevant to criminal behavior. A deficit in controlling, regulating, inhibiting, or putting a "brake" on behavior is associated with actions characterized as impulsive, nonthinking, unreflective, thrill seeking, impatient, seeking immediate gratification, and so forth.

The following vignette was provided by an individual who had a successful 17-year career as a law enforcement officer.

> Even as a young child, I was impulsive and unstoppable. At five, I ran out onto a busy street and was hit by a car, although luckily I wasn't seriously injured.
>
> Later that year, I was burning some trash with my brother. I decided it would be a good idea to burn the frayed white material from the worn-down knees of my jeans. My pants caught fire. I ended up in the hospital with large burn blisters on both legs.
>
> At 14, I was playing with matches and gasoline in our family's two-car detached garage. The gas can suddenly burst into flames, and the garage burned to the ground with my parent's new car inside. My parents somehow believed the story I made up to cover the incident, although the fire department and several of my siblings were suspicious of my tale. Even then, in early adolescence, I somehow knew that unless I changed my behavior I would probably end up in jail someday.

Emotion: Managing Frustration and Regulating Emotions

This EF is closely related to the preceding EF, but its distinctiveness resides in that it refers to symptoms of irritability, low frustration tolerance, hot temper, explosive excitability, and general emotional hyper-responsiveness that frequently characterize those with ADHD (Barkley, 2006e). The following vignette of an individual who was subsequently diagnosed with ADHD after his arrest is taken from Eme (2007a).

> Roger, 35, has been arrested for domestic assault on his wife and resisting arrest. It has taken four officers to arrest and wrestle Roger into the police car and get him to the jail as he has been fighting emotionally and physically the entire way.
>
> Although not appearing to be under the influence of alcohol or drugs, Roger continues to fight and cry as he arrives at the jail. Jail staff immediately assists in escorting Roger to the padded cell. When the door is closed, Roger immediately jumps up and begins screaming and yelling and pounding his fist on the padded walls.

After about an hour, Roger has finally calmed down and jail staff is able to talk to him; he seems fairly calm and rational. Roger agrees to undergo the jail booking procedures. During the booking process Roger is still very emotional, crying and apologetic to staff for the way he was acting when he came in. He makes many self-derogatory remarks about how he has messed up his life and hurt his family. Roger presents no further problems to jail staff and after court in the morning is released on his own recognizance.

Executive Attention: Selecting, Focusing, Shifting Attention

Attention is a multidimensional concept that encompasses different kinds of attentional networks (Nigg, 2006; Posner & Rothbart, 2007). The two networks that have the most scientific support are the executive attention network and the alerting/arousal network (Nigg, 2006; Posner & Rothbart, 2007). Executive attention deficits are commonly associated with impairments such as organizational problems; distractibility; failure to stay on task, to complete projects or homework assignments; grave difficulties in processing information, and so forth. Indeed, the symptom most indicative of adult ADHD is "being easily distracted" (Barkley & Murphy, 2006).

The following vignette of a young adult male illustrates a profound deficit in executive attention.

> The problem that dominated my life and shaped my personality was the need to avoid the piercing, rasping, blasting, disorganized chaos of incoming stimuli that I could not filter out, could not ignore. This made it hard for me to relate to other people; to think, study, make it in school, to carry out tasks, plan ahead, and remember.

Attention: Alerting, Arousal, Activation

Deficits in the alerting/arousal attention network are characterized by three key symptom clusters: (a) stares into space/daydreams; (b) low in energy, sluggish, or drowsy; and (c) apathetic or unmotivated to engage in boring goal-directed activity (Eme, 2007b). Activation deficits involve problems with initiating, organizing, and prioritizing work activities, including class work or homework, and any other tasks that are not self-selected for enjoyment. There are chronic problems with task activation/initiation; in the words of one individual, "I am a deadly procrastinator."

T. Brown (2005, p. 23) provides the following vignette of a highly successful attorney who was at serious risk for losing his job.

> All my life I have had trouble getting started on my work . . . A couple of times a week I set aside several hours for paperwork that I want to get done . . . But I just can't get myself to start . . . The end of the day comes and my work isn't even started . . . I go home and about 10 p.m. I suddenly realize I've got that report to do or I am going to be in very serious trouble at work. At that point I don't have any trouble getting started. It's a hell of a way to have to live.

Memory: Utilizing Working Memory and Accessing Recall

Although the exact nature of working memory eludes consensus (Ackerman, Beier, & Boyle, 2005; Kane, Hambrick, & Conway, 2005), there is broad agreement that, in contrast to short-term memory, it is not simply a temporary storage system. Rather, it involves the active processing and manipulation of information in memory that has been activated (T. Brown, 2005) and this activation and processing is strongly related to attention control (Kane et al., 2005) and hence influences the ability to recall previously learned information. Deficits in this EF have their most conspicuous adverse effect on academic functioning involving note taking and test performance, as the following vignettes of two college students with ADHD illustrate.

> When the professor is lecturing and I'm trying to take notes—like he'll say one thing and then move on to another. While I am trying to jot that one thing down, as he's still talking, if he moves into the next thing, I can't remember what he transitions into or what he said previously. I mean, maybe I'll forget parts of the phrases and my notes are kind of incomplete because I can't remember the second part of what he just said.
>
> It's so frustrating when I study hard for a test and then can't remember what I learned. I'll study hard and learn everything. My friends quiz me and I've got it all down. . . And then when I'm actually taking the test, a big chunk of what I knew so well the night before just evaporates . . . Then a few hours later . . . it's all back again. It was in my mind. I just couldn't retrieve it.

Effort: Sustaining Effort and Motivation

Perhaps the single most important and most misunderstood feature of ADHD is the incredible variability of functioning contingent on level of interest in the task at hand (Barkley, 2006d; T. Brown, 2005). It is precisely this variability that gives rise to the unwarranted accusations that individuals with ADHD are simply lazy, stubborn, or lacking in will power (T. Brown, 2005). Indeed, there commonly are some activities in which those with ADHD can sustain attention very well, even to the extent of becoming "hyperfocused" and neglecting other important activities (T. Brown, 2005). Typically, these activities are either novel or very enjoyable to the individual and may include sports, computer use, music, art, or playing video games. Yet, these same individuals are typically not able to sustain attention well enough to complete routine tasks, even when they are aware of the importance of doing so. Consequently, their achievement levels and their grades in school, as well as functioning in other areas of life, can vacillate from very high to very low (T. Brown, 2005).

As the following vignettes from two students in doctoral clinical psychology programs indicate, their failure to sustain effort is not a function of lack of trying but of an EF deficit that they struggle to overcome. The main method for compensating for this deficit in those who do perform fairly well academically is to spend at least three to four times longer trying to complete a task. In effect, it is analogous to try to perform a complex task when seriously sleep deprived—it can be accomplished but only with enormous effort.

> My skin crawls when I have to sit down and study boring material. After 3 or 4 minutes, I will tune out or fall asleep. It requires tremendous energy to stay focused. Consequently, I am a deadly procrastinator.
>
> I know what I am supposed to do. I can't sustain motivation to engage it continuously. Start, boring, stop, start, boring, enter increases in frustration, and decreases in what little motivation remains. Give up!

Risk for Crime and Recidivism

ADHD typically does not occur as a single disorder in diagnosed individuals, but co-occurs or is comorbid with a variety of other disorders, the most common of which are oppositional defiant disorder (ODD), CD, and substance use disorder (SUD; Jain et al., 2007). In view of this pervasive comorbidity, this article proposes that ADHD increases the risk for criminal behavior and recidivism through three major mechanisms. First, it proposes that deficits in EF markedly increase the risk for developing oppositional defiant behavior, which, in interplay with certain environments, markedly increases the risk for developing CD and hence subsequent adult criminality. Second, it proposes that comorbid ADHD/CD increases the risk for a SUD as well as academic and job failure. Third, it proposes that this toxic brew of ADHD/CD with frequently occurring SUD increases the risk for criminal behavior and recidivism and thus explains the high prevalence (at least 25%) of ADHD among offenders. Other variables and linkages are no doubt involved, but it is hoped that this model has articulated the most important components.

ODD/CD and Adult Criminality

ADHD is a potent risk factor for the development of ODD because the cardinal symptom of impulsivity, combined with frequently occurring features such as low frustration tolerance, anger outbursts, emotional liability, academic failure, etc., increase the likelihood of ODD and thus helps explain a comorbidity rate of at least 55% (Barkley, 2006e). This highly challenging comorbid behavior is theorized to elicit negative and maladaptive parenting, which helps explain why CD develops in at least 25% of youth who have ADHD and ODD (Chronis et al., 2007; Nigg & Breslau, 2007; Whittinger, Langley, Fowler, Thomas, & Thapar, 2007). The risk for developing CD increases even further when youth comorbid for ADHD/ODD are raised in dysfunctional families and neighborhoods (Button, Scourfield, Martin, Purcell, & McGuffin, 2005; Chronis et al., 2007; Rutter, 2006).

Furthermore, adult criminals most commonly represent a pernicious form of CD termed life-course persistent (LCP). This refers to the childhood-onset (e.g., before age 10) of severe conduct problems that emerge from early neurodevelopmental (such as ADHD) and family adversity risk factors, tend to be life-course persistent LCP, and hence are strong predictors of adult antisocial behavior (Biederman, Monuteaux, et al., 2006; Eme, 2007a; Lahey et al., 2005). LCP individuals are the "… few, persistent and pathological" (Moffitt, 2006, p. 571) who represent the approximately 10% of individuals who commit more than 50% of the crimes in the United States (Moffitt, 2005). There is mountainous evidence that ADHD is an exceedingly common comorbid condition of LCP/CD, with estimates typically ranging from 20% to 50% (Barkley, 2006a; Lynam, 1996; Waschbusch, 2002) and in some studies approaching 100% (Klein et al., 1997; Lahey et al., 2005). Moreover, individuals who are comorbid for ADHD and LCP/CD display a more pernicious form of antisocial behavior than those with a single disorder in terms of a greater range, severity, and persistence of antisocial activity (Barkley, 2006a).

Substance Use Disorder

With a lifetime prevalence of 15%, SUD is one of most common and serious mental health disorders in the United States and is associated with significant morbidity in multiple realms of functioning (Waxmonsky & Wilens, 2005). As with criminality, ADHD markedly increases the risk for using illicit substances, especially when it is comorbid with CD or ODD in childhood (August et. al, 2006; Barkley, 2006e; Brown, Anderton, & Roy, 2006; Wilens, 2004b; Wilson & Levin, 2005). Approximately 25% of those with ADHD will develop an SUD in adolescence or early adulthood (Wilens, 2004b), with the lifetime risk being 55% (Biederman, 2006b). Those comorbid for SUD/ADHD become dependent more quickly, remain so for longer periods of time, are at greater risk for treatment failure (R. Brown et al., 2006; Levin et al., 2004; Wilens, 2004a), and are most at risk for criminal violence (Tudisco, 2006).

Two major theories have been proposed to explain why ADHD increases the risk for licit (e.g., nicotine) and illicit (e.g., cannabis) substance use and the development of SUD in adolescents (Barkley, 2006e; Marshal & Molina, 2006). First, as previously discussed, ADHD increases the likelihood of developing ODD and CD, which in turn increases the risk for using illicit substances (Barkley, 2006e). This comorbidity increases the risk for academic and social failure (Barkley, 2006b; R. Brown et al., 2006; Marshal & Molina, 2006) and the risk for school nonattendance, dropping out, and associating with substance using, deviant peers (R. Brown et al., 2006; Marshal & Molina, 2006).

Second, despite a paucity of systematically derived data, it is highly probable that self-medication is one of the factors that contributes to SUD for a subgroup of individuals with ADHD (Wilens, 2004a, 2006). Although initial drug usage for individuals with ADHD is for the usual reasons (e.g., experimentation, desire for peer acceptance, assuage psychological distress), once usage has begun, the self-medication factor reinforces and adds to the initial reasons (R. Brown et al., 2006). The evidence for this theory is based on numerous accounts of individuals with SUD reporting increased relaxation and improved attention when using substances such as nicotine, cannabis, and alcohol (R. Brown et al., 2006; Eme, 2007b;

Wilens, 2004a). Furthermore, there is sound scientific basis for the validity of these self-reports because both addictive drugs and stimulant medication for treating ADHD (Ritalin, Adderall) stimulate the release of the same neurotransmitters (dopamine and norepinephrine; Biederman, 2006b; Camí & Farré, 2003; Connor, 2006; Iversen, 2006). Hence, it is not surprising that the treatment of ADHD with stimulants reduces the initiation of substance abuse (Biederman, Spencer, Wilens, Prince, & Farone, 2006; Katusic et al., 2005).

Finally, the ADHD/ODD/CD/SUD link might also be due in part to a genetic mechanism termed pleiotropy, in which a single gene or set of genes influences the expression of multiple phenotypic traits (Rutter, 2006). Jain et al. (2007) have recently provided evidence supporting the hypothesis that the same set of major genes underlie a broad behavioral phenotype that can manifest as a range of symptoms that includes ADHD/ODD/CD/SUD.

When deficits in EF combine with the acquired psychosocial deficits of ODD, CD, SUD, or any combination thereof, they produce a toxic brew that markedly impairs academic and job functioning for all of the obvious reasons.

Academic Functioning

Academic functioning is a domain of tremendous difficulty for youth with ADHD and various comorbidities (ODD, CD, and SUD) such that almost all clinic-referred children perform poorly at school (Barkley, 2006e). For example, approximately 30% repeat a grade, 30% to 40% are placed in special education, 45% are suspended from school, and 10% to 35% drop out (Barkley, 2006e). These difficulties can be expected to increase the likelihood that the student will reject the socializing school experience for more risky antisocial street experiences, and thus they provide another mechanism for increasing the risk for criminal behavior and recidivism.

Job Functioning

When youth with ADHD becomes adults they are more likely to be unemployed than those without ADHD (Kessler et al., 2006). Adults with ADHD are more likely to quit out of boredom and to be disciplined or fired because of problems such as difficulty getting along with others, working independently, being punctual, and managing time and daily responsibilities (Murphy & Barkley, 2007). For example, the highly successful founder and former CEO of JetBlue Airways, David Neeleman, whose ADHD contributed to his dropping out of college and who was not diagnosed until adulthood, was once fired from a vice president's job at Southwest Airlines because he lacked diplomacy (Hallowell & Ratey, 2005; Shellenbarger, 2006). As with academic failure, job failure can be expected to increase the risk for criminal behavior and recidivism.

Conclusion

This review has established the critical importance of identifying and treating ADHD as an essential component for any best practices model for the provision of mental health services in the correctional system. It logically follows that an adequate understanding of ADHD is an essential component for the satisfactory education of all involved in this system. The information presented in this article is a solid contribution to this education, which needs to be built on and implemented. With such education, the respective personnel would be better able to competently serve the 25% or more of inmates with ADHD.

Note

1. The metaphor of a slowing top is apt because, contrary to what might be expected given the symptom of hyperactivity, certain portions of the brains of those with ADHD are actually underactivated, i.e., spinning too slowly, and thus not functioning properly, resulting in ADHD symptoms (Valera et al., 2007).

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